

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the present application.

Listing of Claims:

Claims 1 through 6 (canceled)

Claim 7 (previously presented): A graphical-object bearing surface as set forth in claim 46, wherein said secondary information relates to a unifying rule for generating an information item by unifying bit data correlated to a plurality of said graphical-object clusters.

Claim 8 (previously presented): A graphical-object bearing surface as set forth in claim 46, wherein said arrangement of said graphical-object clusters is assigned information relating either to coordinate axes for, or to the orientation of, an array of said graphical-object clusters.

Claim 9 (previously presented): A graphical-object bearing surface as set forth in claim 8, wherein a layout spacing between said graphical-object clusters as arranged two-dimensionally is defined for each coordinate axis.

Claim 10 (currently amended): A physical surface bearing graphical [[-]] objects bearing surface as set forth in claim 8 recognizable by digital information capturing means, said graphical objects being patterned so as to predetermine groupings thereof that interrelate by a clustering definition establishing clusters of said graphical objects and that thereby encode primary information at least identifying the placement of the clusters of said graphical objects within the entire pattern of said graphical objects on said surface, and

to predetermine an arrangement of said graphical-object clusters relative to each other that encodes secondary information different from the primary information, said arrangement of said graphical-object clusters being assigned

information relating either to coordinate axes for, or to the orientation of, an array of said graphical-object clusters, wherein:

among a number d (wherein $d \geq 4$) of said graphical-object clusters arranged consecutively, a number e of graphical-object clusters satisfying the condition $e < d/2$ are arranged offset in a direction orthogonal to an arraying direction formed by the remaining number $d - e$ of graphical-object clusters; and

the information relating to the coordinate axes is assigned to the arraying direction, and the information relating to orientation is assigned to the offset.

Claim 11 (previously presented): A graphical-object bearing surface as set forth in claim 43, wherein said graphical objects are patterned so as to enable, via digital information capturing means:

configuration of a logical block formed by unifying a plurality of unit graphical-object clusters being the minimum units for decoding bit data from any said graphical-object clusters;

assigning an item of information to an array formed by unifying any number of constituent elements of a given configured logical block; and

configuration of a new logical block by replacing at least one of the constituent elements of said given logical block with a unit graphical-object cluster neighboring said given logical block.

Claim 12 (currently amended): A physical surface bearing graphical [[[-]] objects bearing surface as set forth in claim 11, wherein recognizable by digital information capturing means, said graphical objects being patterned so as to predetermine groupings thereof that interrelate by a clustering definition establishing clusters of said graphical objects and that thereby encode primary information at least identifying the placement of the clusters of said graphical objects within the entire pattern of said graphical objects on said surface, and to enable, via digital information capturing means

configuration of a logical block formed by unifying a plurality of unit graphical-object clusters being the minimum units for decoding bit data from any said graphical-object clusters;

assigning an item of information to an array formed by unifying any number of constituent elements of a given configured logical block, said given logical block [[is]] being constituted from a larger number of said unit graphical-object clusters than the number of elements in the array to which said item of information is assigned; and

configuration of a new logical block by replacing at least one of the constituent elements of said given logical block with a unit graphical-object cluster neighboring said given logical block.

Claim 13 (currently amended): A physical surface bearing graphical [[-]] objects bearing surface as set forth in claim 11, wherein recognizable by digital information capturing means, said graphical objects being patterned so as to predetermine groupings thereof that interrelate by a clustering definition establishing clusters of said graphical objects and that thereby encode primary information at least identifying the placement of the clusters of said graphical objects within the entire pattern of said graphical objects on said surface, and to enable, via digital information capturing means

configuration of a logical block formed by unifying a plurality of unit graphical-object clusters being the minimum units for decoding bit data from any said graphical-object clusters;

assigning an item of information to an array formed by unifying any number of constituent elements of a given configured logical block, said item of information [[is]] being information with which the layout coordinates of any constituent element of said logical block are specifiable; and

configuration of a new logical block by replacing at least one of the constituent elements of said given logical block with a unit graphical-object cluster neighboring said given logical block.

Claim 14 (currently amended): A physical surface bearing graphical [[[-]]
objects bearing surface as set forth in claim 43, wherein recognizable by digital
information capturing means, said graphical objects [[are]] being patterned:
so as to predetermine groupings thereof that interrelate by a clustering
definition establishing clusters of said graphical objects and that thereby encode
primary information at least identifying the placement of the clusters of said graphical
objects within the entire pattern of said graphical objects on said surface;

so as to contain a bit matrix V formed by arranging, in matrix form, array elements b_m ($m = 0$ to $n-1$) of a reference-bit array B having a predetermined array length n , wherein bit data is correlated to the bit matrix V ;

so that two matrix elements $v(i, j)$ and $v(i+1, j)$ neighboring one (i -axis) of the two array axes of the bit matrix V satisfy

$$v(i, j) = b_m$$

$$v(i+1, j) = b_{m+1}; \text{ and}$$

so that two matrix elements $v(i, j)$ and $v(i, j+1)$ neighboring the other array axis (j -axis) of the bit matrix V satisfy, letting the amount by which the array elements b_m are offset toward the j -axis be a ,

$$v(i, j) = b_m$$

$$v(i, j+1) = b_{m+a},$$

wherein the amount of offset a toward the j -axis is an integer equal to or greater than 2.

Claim 15 (previously presented): A method of decoding, via digital information capturing means, bit data from a graphical-object bearing surface as set forth in claim 14, comprising, for a logical block that is a partial matrix in the bit matrix V , in which any one matrix element $v(i, j)$ of the bit matrix V is the starting point, and the array length along the i -axis is the offset a , with the positive direction of the i -axis being a main scanning direction and the positive direction of the j -axis being a sub-scanning direction of the digital information capturing means,

unifying any of the constituent elements of said logical block so as to form a bit array that is identical with a partial array of the reference-bit array B .

Claim 16 (previously presented): A bit-data decoding method as set forth in claim 15, wherein the reference-bit array B is constituted so that partial arrays of predetermined length obtained with arbitrary offsets differ from each other.

Claim 17 (previously presented): A bit-data decoding method as set forth in claim 15, further comprising replacing the matrix element $v(i, j)$ constituting said logical block and forming the terminus of the array in the main scanning direction, on the condition that either of the matrix elements $v(i-a, j+1)$ and $v(i+a, j-1)$ neighbors said logical block, with either of said matrix elements, to thereby configure of a new logical block.

Claim 18 (previously presented): A bit-data decoding method as set forth in claim 15, further comprising removing from said logical block the matrix element constituting the first in said bit array, and adding the matrix element adjacent, in the main scanning direction, to the matrix element constituting the last in said bit array, to thereby configure a new logical block.

Claim 19 (previously presented): A bit-data decoding method as set forth in claim 15, further comprising removing from said logical block the matrix element constituting the last in said bit array, and adding the matrix element adjacent, in the opposite direction from the main scanning direction, to the matrix element constituting the first in said bit array, to thereby configure a new logical block.

Claims 20-42 (canceled)

Claim 43 (currently amended): A physical surface bearing graphical objects recognizable by digital information capturing means, said graphical objects being patterned so as to predetermine groupings thereof that interrelate by a clustering definition establishing clusters of said graphical objects and that thereby encode primary information at least identifying the placement of the clusters of said graphical objects within the entire pattern of said graphical objects on said surface.

Claim 44 (previously presented): A graphical-object bearing surface as set forth in claim 43, wherein said graphical objects are patterned so as further to predetermine at least one interrelationship that does not encode said primary information.

Claim 45 (previously presented): A graphical-object bearing surface as set forth in claim 43, wherein said graphical objects are patterned in a manner such that the predetermined groupings each include at least one graphical object in common.

Claim 46 (previously presented): A graphical-object bearing surface as set forth in claim 43, wherein said graphical objects are patterned so as further to predetermine an arrangement of said graphical-object clusters relative to each other that encodes secondary information different from the primary information.